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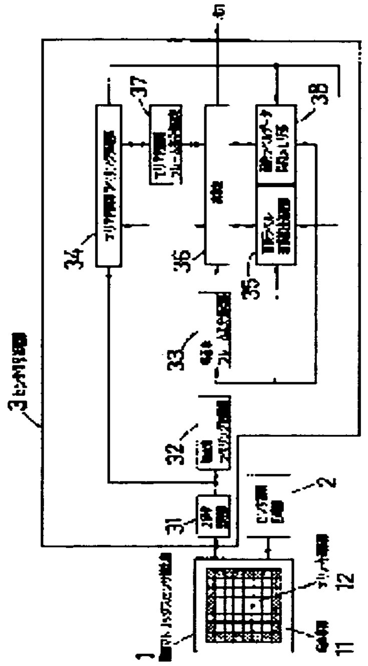
(54) THERMAL IMAGE SENSOR SYSTEM

(57)Abstract:

PROBLEM TO BE SOLVED: To detect a human body discriminated from another heat source by binarizing image signals from a thermal type infrared matrix sensor detecting part, by carrying out labeling for detecting a heat source as a prospective human body, and by carrying out labeling for a heat source within an in-area pixel part.

SOLUTION: Pixels of a thermal infrared matrix sensor detecting part 1 are divided into an end pixel part 1 an in-area pixel part 12. Pixel signals from the detecting part 1 are binarized (31), and a heat source is extracted. Successive pixels extracted from the pixel part 11 is subjected to an identical leveling process 32 so as to extract a heat source as a prospective human body, and a process of difference 33 between frames of sensor signals from the pixel parts 11 is carried out, and then the signals are delivered to a computing part 36. Meanwhile, the successive pixels extracted in the pixel part 12 are subjected to an identical labeling process 34, and are delivered to the computing part 36. Further, the computing part 33 determines the presence of human bodies, a number and positions thereof.



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[Date of final disposal for application]

[Patent number]

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CLAIMS

[Claim(s)]
[Claim 1] The type-of-fever infrared matrix sensor detecting element which comes to arrange the pixel which detects infrared radiation in the shape of a matrix, The sensor control circuit section which controls this type-of-fever infrared matrix sensor detecting element, In the thermal imagery sensor system which comes to have the sensor signal-processing section which incorporates the sensor picture signal from a type-of-fever infrared matrix sensor detecting element, performs signal processing, and detects the body Each pixel of said type-of-fever infrared matrix sensor detecting element is divided into the edge picture element part arranged on the outskirts, and the picture element part in area arranged inside. In said sensor signal-processing section The binary-ized processing section which performs binary-ized processing for extracting a heat source from the sensor picture signal from a type-of-fever infrared matrix sensor detecting element, The edge pixel labeling section which performs labeling for the signal from the binary-ized processing section to detect the heat source as a body candidate, inter-frame [of the heat source as a body candidate by which labeling was carried out] -- the edge pixel frame which asks for difference -- difference -- with the processing section The thermal imagery sensor system characterized by coming to have the pixel labeling processing section in area which performs labeling to the heat source in the picture element part in said area, and the operation part which judges the body based on the signal from said each part.
[Claim 2] said operation part -- an edge pixel frame -- difference -- the thermal imagery sensor system according to claim 1 characterized by judging that the heat source as a body candidate by which labeling was carried out moved to the picture element part in area from the edge picture element part when both had correlation with the output signal of the processing section and the pixel labeling processing section in area, and making it judge that the heat source as said body candidate is the body.
[Claim 3] the frame for detecting migration of the heat source in the picture element part in said area -- difference -- the pixel frame in area which processes -- difference -- the processing section -- adding -- said operation part -- said pixel frame in area -- difference -- the frame from the processing section -- difference -- the thermal imagery sensor system according to claim 1 or 2

characterized by pursuing a heat source using data.
[Claim 4] The thermal imagery sensor system according to claim 1 to 3 which adds the pixel label area calculation processing section which asks for the area of the pixel set by which labeling was carried out, and is characterized by judging whether a heat source is the body with the magnitude of the area called for by the pixel label area calculation processing section in said operation part.
[Claim 5] The thermal imagery sensor system according to claim 1 to 4 characterized by making it judge that it is not the body when changeless to the sampling whose heat source as a body candidate labeling was carried out [the heat source] by the edge pixel labeling processing section is a count of predetermined in said operation part.
[Claim 6] The thermal imagery sensor system according to claim 1 to 5 characterized by arranging two or more said type-of-fever infrared matrix sensor detecting elements, and sending the OR output of the sensor picture signal from each type-of-fever infrared matrix sensor detecting element to the sensor signal-processing section.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the thermal imagery sensor system which detects body information, such as existence of the man in area, a number, and a location, by detecting the infrared radiation from the body.
[0002]
[Description of the Prior Art] Conventionally, the infrared camera using the quantum mold infrared sensor as what forms thermal imagery is known well. However, since cooling to liquid nitrogen temperature was the need, the quantum mold infrared sensor had a limitation in the miniaturization, and since the price also became very expensive, it was not able to use a component for the noncommercial way. Then, development of the thermal imagery sensor using small and the type-of-fever infrared sensor of a low price is performed. For example, PbTiO There are some which operate mechanically the 8-pixel linear array using the ceramic pyroelectric material of a system, and the thing of a 8x64 pixels and comparatively a high pixel is obtained. [number / of pixels] However, in order to use mechanical actuation, a life is short, and when lighting control, a crime prevention system, etc. need to be long duration used, it is unsuitable. Moreover, since the ceramic pyroelectric material uses the principle of catching a changed part of the infrared radiation from a heat source by the dielectric polarization of an ingredient, the detection to a stationary heat source is impossible for it. Although the detection of a heat source which stood it still by carrying out chopping mechanically will also be attained if it is a single component and an linear array, whether what we do with chopping by the heat pixel matrix sensor poses a problem, and detection of the quiescence body is difficult.
[0003] The detection of a heat source which there is a thermistor bolometer which detects the temperature change by infrared absorption by change of electric resistance, and is standing it still without mechanical chopping is possible as what does not need such mechanical actuation on the other hand.
[0004]
[Problem(s) to be Solved by the Invention] However, in detection of the above heat sources, even if the stationary heat source was detectable, the detected heat source could not distinguish the thing from other heat sources, such as a

chair with which warmth remains, after the thing from the body, a personal computer and a fluorescent lamp, sunlight, and a man sat down, but there was a problem of including a remarkable error.

[0005] Making this invention in view of the above-mentioned point, the place made into the purpose is to offer the thermal imagery sensor system which can distinguish the body from other heat sources and can detect it.

[0006]

[Means for Solving the Problem] The type-of-fever infrared matrix sensor detecting element to which invention according to claim 1 comes to arrange the pixel which detects infrared radiation in the shape of a matrix, The sensor control circuit section which controls this type-of-fever infrared matrix sensor detecting element, In the thermal imagery sensor system which comes to have the sensor signal-processing section which incorporates the sensor picture signal from a type-of-fever infrared matrix sensor detecting element, performs signal processing, and detects the body Each pixel of said type-of-fever infrared matrix sensor detecting element is divided into the edge picture element part arranged on the outskirts, and the picture element part in area arranged inside. In said sensor signal-processing section The binary-ized processing section which performs binary-ized processing for extracting a heat source from the sensor picture signal from a type-of-fever infrared matrix sensor detecting element, The edge pixel labeling section which performs labeling for the signal from the binary-ized processing section to detect the heat source as a body candidate, inter-frame [of the heat source as a body candidate by which labeling was carried out] -- the edge pixel frame which asks for difference -- difference -- with the processing section It is characterized by coming to have the pixel labeling processing section in area which performs labeling to the heat source in the picture element part in said area, and the operation part which judges the body based on the signal from said each part.

[0007] invention according to claim 2 -- invention according to claim 1 -- setting -- said operation part -- an edge pixel frame -- difference -- when both have correlation with the output signal of the processing section and the pixel labeling processing section in area, it is characterized by judging that the heat source as a body candidate by which labeling was carried out moved to the picture element part in area from the edge picture element part, and making it judge that the heat source as said body candidate is the body.

[0008] a frame for invention according to claim 3 to detect migration of the heat source in the picture element part in said area in invention according to claim 1 or 2 -- difference -- the pixel frame in area which processes -- difference -- the processing section -- adding -- said operation part -- said pixel frame in area -- difference -- the frame from the processing section -- difference -- it is characterized by pursuing a heat source using data.

[0009] In invention according to claim 1 to 3, invention according to claim 4 adds the pixel label area calculation processing section which asks for the area of the pixel set by which labeling was carried out, and is characterized by judging whether a heat source is the body with the magnitude of the area called for by the pixel label area calculation processing section by said operation part.

[0010] In invention according to claim 1 to 4, by said operation part, invention according to claim 5 is characterized by making it judge that it is not the body, when changeless to the sampling whose heat source as a body candidate labeling was carried out [the heat source] by the edge pixel labeling processing section is a count of predetermined.

[0011] In invention according to claim 1 to 5, invention according to claim 6 arranges two or more said type-of-fever infrared matrix sensor detecting elements, and is characterized by sending the OR output of the sensor picture signal from each type-of-fever infrared matrix sensor detecting element to the sensor signal-processing section.

[0012]

[Embodiment of the Invention] Hereafter, an example of the gestalt of operation of this invention is explained based on a drawing. Drawing 1 is the block diagram of the thermal imagery sensor system in which an example of the gestalt of operation of this invention is shown. 1 is a type-of-fever infrared matrix sensor detecting element, and is divided into the edge picture element part 11 arranged on the outskirts, and the picture element part 12 in area arranged inside. 2 is the sensor control circuit section and controls the output of the sensor picture signal from each pixel of the type-of-fever infrared matrix sensor detecting element 1. 3 -- the sensor signal-processing section -- it is -- the binary-ized processing section 31, the edge pixel labeling processing section 32, and an edge pixel frame -- difference -- the processing section 33, the pixel labeling processing section 34 in area, the pixel label area calculation processing section 35, operation part 36, and the pixel frame in area -- difference -- it comes to have the processing section 37 and the pixel label data maintenance memory section 38 The binary-ized processing section 31 is for extracting a heat source by making binary the sensor picture signal outputted from the type-of-fever infrared matrix sensor detecting element 1 with a predetermined threshold. The edge pixel labeling processing section 32 performs the same labeling to the pixel which continued among the pixels extracted as a heat source by the edge picture element part 11, and extracts a body candidate's heat source. an edge pixel frame -- difference -- when the processing section 33 takes the inter-frame difference of the sensor picture signal from the edge picture element part 11 and the heat source as a body candidate disappears, a body candidate's heat source can presume that it entered in area. The pixel labeling processing section 34 in area performs the same labeling to the pixel which continued among the pixels extracted as a heat source by the picture element part 12 in area. The pixel label area calculation processing section 35 computes the area of the pixel set by which the same labeling was made in the edge pixel labeling processing section 32 or the pixel labeling processing section 34 in area. operation part 36 -- the edge pixel labeling processing section 32 and an edge pixel frame -- difference -- existence of the body, a number, a location, etc. are judged based on the signal from the processing section 33, the pixel labeling processing section 34 in area, and the pixel label area calculation processing section 35. For example, the area of the pixel set by which labeling was carried out in the edge pixel labeling processing section 32 is computed by the pixel label area calculation processing section 35.

When this area is judged to be the predetermined magnitude equivalent to human being's magnitude Having disappeared with the signal from the processing section 33 is recognized. the heat source which has recognized this heat source to be a body candidate, next became a body candidate -- an edge pixel frame -- difference -- further by the image data from the pixel labeling processing section 34 in area When a heat source appears in area and correlation is between the pixel data of the edge pixel labeling processing section 32, and the pixel data of the pixel labeling processing section 34 in area, it judges that the heat source as a body candidate entered in area, and this is judged to be the body. When the area of the pixel set to which labeling of the edge picture element part 11 was carried out is not predetermined magnitude, or when the location of the pixel set by which labeling was carried out does not move as a result of the sampling of the count of predetermined, it judges that the heat source is not the body, and the label is eliminated.

[0013] moreover, the pixel frame in area -- difference -- the processing section 37 can take the inter-frame difference of the sensor picture signal from the picture element part 12 in area, and can pursue migration for the aggregate of the pixel by which labeling was carried out based on the result of this difference. The pixel label data maintenance memory section 38 memorizes the pixel data by which labeling was carried out. the pixel frame in area -- difference -- the image data of the processing section 37 -- the body -- pursuing -- on the way -- the trace of the body is continuable by memorizing the image data in front of that in the pixel label data maintenance memory section 38, even when it comes out and the body is interrupted with a shelter, and referring to the image data memorized in the pixel label data maintenance memory section 38 again, when a heat source appears.

[0014] Moreover, two or more type-of-fever infrared matrix sensor detecting elements 1 which supervise the same area may be formed, and dependability can be raised if it is made to perform signal processing in the sensor signal-processing section 3 based on what took the OR of the sensor picture signal made binary from each type-of-fever infrared matrix sensor detecting element 1 in this case.

[0015] Next, actuation of the gestalt of this operation is explained based on the flow chart of drawing 2 . First, the sensor picture signal from the type-of-fever infrared matrix sensor detecting element 1 is made binary, labeling of an edge pixel is performed (when there are two or more type-of-fever infrared matrix sensor detecting elements 1, labeling of an edge pixel is performed to what took the OR), when the location of a label does not move by the sampling of the case where the area of the pixel set by which the same labeling was made is not suitable magnitude, or the count of predetermined, it judges that it is not the body and the label is eliminated.

[0016] Next, a heat source disappears from an edge pixel, when it is judged that the body may have moved into area, labeling of the pixel in area is carried out temporarily, when the pixel in this area and said edge pixel have correlation, it judges that the body enters in area and labeling is performed anew. furthermore, the frame of the pixel in area -- taking difference -- a label -- pursuing -- on the way -- by coming out, holding labeling data and referring to this, also when the body is interrupted with a shelter and appears again Even when the same label can be pursued and heat sources other than the bodies, such as a personal computer, a fluorescent lamp, and sunlight, appear in area, body information with advanced existence of people, number, location, etc. can be correctly detected by carrying out processing which does not perform labeling to these.

[0017] The example hereafter applied to the lighting control system which shows an above-mentioned thermal imagery sensor system to drawing 3 is explained. That is, while saving as useless energy as possible by forming the division area 5 which divided the floor line every lighting fitting 4 about lighting control of much lighting fitting 4 installed in large inside-of-a-house space, such as a library and a conference room, and using the type-of-fever infrared matrix sensor detecting element 1 which made each pixel correspond to this division area 5, it is going to perform fine lighting control to those who are present in a section indoor. luminaire 4a corresponding to the area in which the body is located as are shown in drawing 4 (a), and the division area 5 of the room which corresponds respectively every luminaire 4 is set up so that the Dead Zone may not exist and it is shown in drawing 4 (b) -- all ** -- carrying out -- half luminaire 4around it b -- ** -- ** -- control of carrying out and making other luminaire 4c a halt (OFF) is performed. Furthermore, if it explains to a detail, the target room is divided into the area 5 of the number of the pixel of the type-of-fever infrared matrix sensor detecting element 1, and one area 5 is made to correspond to 1 pixel of the type-of-fever infrared matrix sensor detecting element 1 first, as shown in drawing 5 . It is divided into the area of about 30cm per pixel around when the 64x64-pixel type-of-fever infrared matrix sensor detecting element 1 is used in the room of 20m around. each pixel of the type-of-fever infrared matrix sensor detecting element 1 has a heat source in the corresponding area 5 -- if it becomes, 1 will be outputted and there will be no heat source -- 0 will be outputted if it becomes. In order that drawing 6 may raise dependability, each output and OR at the time of forming two type-of-fever infrared matrix sensor detecting elements 1A and 1B are shown. By forming two or more type-of-fever infrared matrix sensor detecting elements 1 at a different include angle to area By making the pixel of two or more type-of-fever infrared matrix sensor detecting elements 1A and 1B correspond to one area of the room, and taking the OR Even if the detection field of one type-of-fever infrared matrix sensor detecting-element 1A is interrupted by obstructions, such as a column and a desk, type-of-fever infrared matrix sensor detecting-element 1A of another side can detect the body.

[0018] The process which the body enters in area from the edge of the room, and drawing 7 is judged to be the body, and carries out labeling is shown typically. First, as shown in drawing 7 (a), when the body 6 enters from the edge of the room, it carries out labeling, using only the edge pixel corresponding to edge area detection field 5a as a body candidate. Under the present circumstances, since the area of the pixel by which labeling was carried out is measured and it corresponds for 30cm per pixel around, in a certain case, the area of a label does not judge 3 pixels or more to be the body, but eliminates a label. it is the body when the area of a label is less than 3 pixels -- judging -- further -- the frame of an edge picture element part -- difference is taken and it judges whether it has stopped whether the heat source is moving. When a label judges 64x64 pixels [/second] actuation that the heat source is not moving as a 600 times line, it judges that it is not the body and a label is eliminated. moreover, the frame of an edge pixel -- difference -- since it is possible in the body having moved into area when the heat source of an edge pixel disappears by processing, in operation part 36, labeling of the pixel in area corresponding to area detection field 5b is performed. To the location of a pixel where labeling of said edge pixel was carried out, as shown in drawing 7 (b), when the body 6 enters in area detection field 5b, if the location of the pixel in which labeling was carried out by the pixel labeling processing in area is contiguity or less than 5-pixel nearness, it will judge that both have correlation, will judge this heat source to be the body, and will perform labeling anew as a body detection label. this body detection label -- a frame -- since it is pursued by difference, even if the heat source of a personal computer, a fluorescent lamp, etc. appears suddenly in detection area and that heat source is moved possible [detecting, even if the body stops in area], since there is no correlation with an edge pixel, since it is distinguished, the body will not produce malfunction of lighting control. Moreover, as body 6a to which the body detection label was attached shows drawing 8 (a), when it disappears outside from the part of the edge in area, body 6a judges it as what was left from the room, and eliminates a label. however, like drawing 8 (b), when the body detection label 7 disappears in the center of area It is possible that 6a is interrupted for the body by shelters, such as a desk and a chair. In this case Label data is held in the pixel label data maintenance memory section 38, the heat source which appeared in area again and which moves is judged to be the same body 6a like drawing 8 (c), label data is called from the pixel label data maintenance memory section 38, and processing pursued with the same label is performed. Here, since the heat source of a personal computer, a fluorescent lamp, etc. does not move even if another heat-source 6b which is not the body appears, labeling is not carried out. a ****** [that the heat source which appeared again moves] -- the frame in area -- difference -- it can judge by data. the case where the body has lapped -- the frame in area -- difference -- since the label is pursued with data, neither the number nor a location is recognized accidentally

[0019] lighting fitting corresponding to the area where the number and location of the body in the room are detected correctly, and the body exists by performing the above processings -- all ** and half lighting fitting around it -- ** -- ** -- saving of energy can be performed by carrying out.

[0020] Next, the thermal imagery sensor system concerning the gestalt of other operations of this invention is explained. As a type-of-fever infrared matrix sensor detecting element 1, only one train of a matrix instead of a perimeter is set to edge picture element part 11a, and other pixels are set to picture element part 12in area a. And if edge picture element part 11a is made to correspond to area 51a of the side in which the aperture W of the room was installed as shown in drawing 10 , those who output and input from the door D of the opposite side by only the person who enters from Aperture W becoming a candidate for a monitor will not be detected as the body. Therefore, what is necessary is just to eliminate a label by distinguishing from the body with the area of the pixel by which labeling was carried out, the passing speed of a heat source, etc., when only what invades unlawfully from Aperture W was detected like drawing 11 (a), the alarm was emitted, sunlight shines in from MADOW or the mite has jumped in from Aperture W. moreover, although edge picture element part 11a reacts also when human being approaches near aperture W out of the room or opens Aperture W, it is show in drawing 11 (b) in this case -- as -- the correlation with the label of edge picture element part 11a, and the label of picture element part 12in area a -- take -- the pixel frame in area -- difference -- since the direction which moves from data is detect and a label is eliminate, an alarm is not issue. Therefore, only a trespasser is detectable.

[0021]

[Effect of the Invention] As mentioned above, the type-of-fever infrared matrix sensor detecting element which comes to arrange the pixel which detects infrared radiation in the shape of a matrix according to invention according to claim 1, The sensor control circuit section which controls this type-of-fever infrared matrix sensor detecting element, In the thermal imagery sensor system which comes to have the sensor signal-processing section which incorporates the sensor picture signal from a type-of-fever infrared matrix sensor detecting element, performs signal processing, and detects the body Each pixel of said type-of-fever infrared matrix sensor detecting element is divided into the edge picture element part arranged on the outskirts, and the picture element part in area arranged inside. In said sensor signal-processing section The binary-ized processing section which performs binary-ized processing for extracting a heat source from the sensor picture signal from a type-of-fever infrared matrix sensor detecting element, The edge pixel labeling section which performs labeling for the signal from the binary-ized processing section to detect the heat source as a body candidate, inter-frame [of the heat source as a body candidate by which labeling was carried out] -- the edge pixel frame which asks for difference -- difference -- with the processing section Since it has the pixel labeling processing section in area which performs labeling to the heat source in the picture element part in said area, and the operation part which judges the body based on the signal from said each part and was made to become, the thermal imagery sensor system which can distinguish the body from other heat sources and can detect it has been offered.

[0022] According to invention according to claim 2, it sets to invention according to claim 1. By operation part an edge pixel frame -- difference -- with the output signal of the processing section and the pixel labeling processing section in area, when both have correlation Since it judges that the heat source as a body candidate by which labeling was carried out moved to the picture element part in area from the edge picture element part and was made to judge that the heat source as said body candidate is the body, body detection with a more high precision can be performed.

[0023] the frame for detecting migration of the heat source in the picture element part in said area in invention according to claim 1 or 2 according to invention according to claim 3 -- difference -- the pixel frame in area which processes -- difference -- the processing section -- adding -- said operation part -- said pixel frame in area -- difference -- the frame from the processing section --

difference -- since the heat source was pursued using data, a trace of the body is attained.
[0024] According to invention according to claim 4, in invention according to claim 1 to 3, the pixel label area calculation processing section which asks for the area of the pixel set by which labeling was carried out is added, and by said operation part, since it was made to judge whether a heat source is the body with the magnitude of the area called for by the pixel label area calculation processing section, the body can be correctly judged to the heat source of a mite etc.
[0025] Since it was made to judge that it is not the body when changeless [to the sampling whose heat source as a body candidate labeling was carried out / the heat source / by operation part by the edge pixel labeling processing section is a count of predetermined] in invention according to claim 1 to 4 according to invention according to claim 5, the heat source of sunlight, a fluorescent lamp, etc. and the heat source from the body are distinguishable.
[0026] According to invention according to claim 6, it sets to invention according to claim 1 to 5. Since two or more type-of-fever infrared matrix sensor detecting elements are arranged and the OR output of the sensor picture signal from each type-of-fever infrared matrix sensor detecting element was sent to the sensor signal-processing section Even when the detection field of one type-of-fever infrared matrix sensor detecting element is interrupted with an obstruction etc., detection dependability improves by detecting by other type-of-fever infrared matrix sensor detecting elements.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram of the thermal imagery sensor system in which an example of the gestalt of operation of this invention is shown.
[Drawing 2] It is the flow chart which shows actuation same as the above.
[Drawing 3] It is the mimetic diagram showing the example which applied the thermal imagery sensor system of drawing 1 to lighting control.
[Drawing 4] It is the mimetic diagram showing actuation of lighting fitting concerning the same as the above.
[Drawing 5] It is the mimetic diagram showing the correspondence relation of each pixel of detection area and a type-of-fever infrared matrix sensor detecting element.
[Drawing 6] It is the mimetic diagram showing the sensor picture signal at the time of using two type-of-fever infrared matrix sensor detecting elements.
[Drawing 7] It is the mimetic diagram showing the decision approach in operation part.
[Drawing 8] It is the mimetic diagram showing the decision approach in operation part.
[Drawing 9] It is the mimetic diagram showing the type-of-fever infrared matrix sensor detecting element concerning the gestalt of other operations of this invention.
[Drawing 10] It is the mimetic diagram showing the correspondence relation of the type-of-fever infrared matrix sensor detecting element and area concerning the same as the above.
[Drawing 11] It is the mimetic diagram showing actuation concerning the same as the above.
[Description of Notations]
1 Type-of-Fever Infrared Matrix Sensor Detecting Element
2 Sensor Control Circuit Section
3 Sensor Signal-Processing Section
11 Edge Picture Element Part
12 Picture Element Part in Area
31 Binary-ized Processing Section
32 Edge Pixel Labeling Processing Section

33 Edge Pixel Frame -- Difference -- Processing Section
34 Pixel Labeling Processing Section in Area
35 Pixel Label Area Calculation Processing Section
36 Operation Part
37 Pixel Frame in Area -- Difference -- Processing Section
38 Pixel Label Data Maintenance Memory Section

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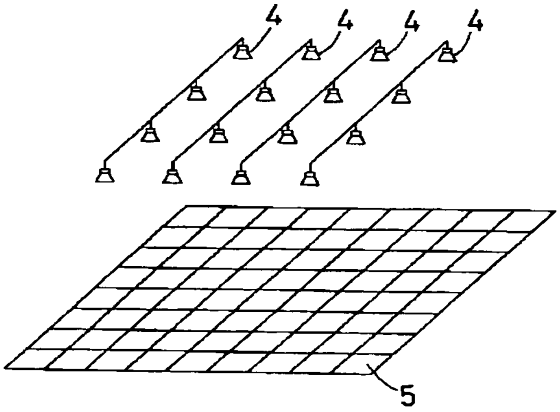
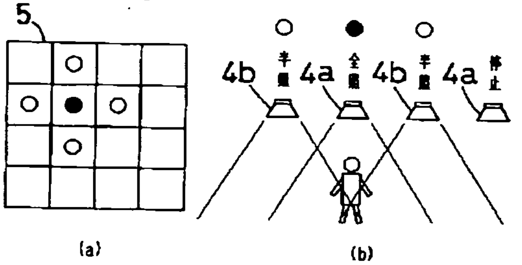
DRAWINGS

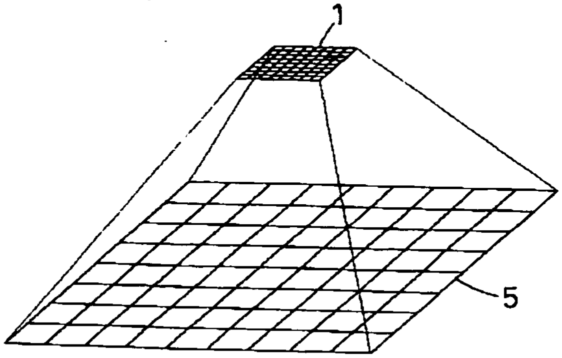
[Drawing 3]



[Drawing 4]



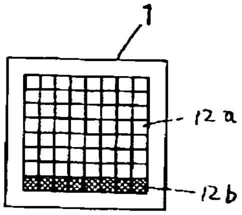
[Drawing 5]



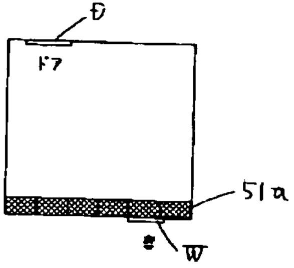
[Drawing 6]

センサ１Ａ	0	0	1	1
センサ１Ｂ	0	1	0	1
制御信号 （論理和）	0	1	1	1

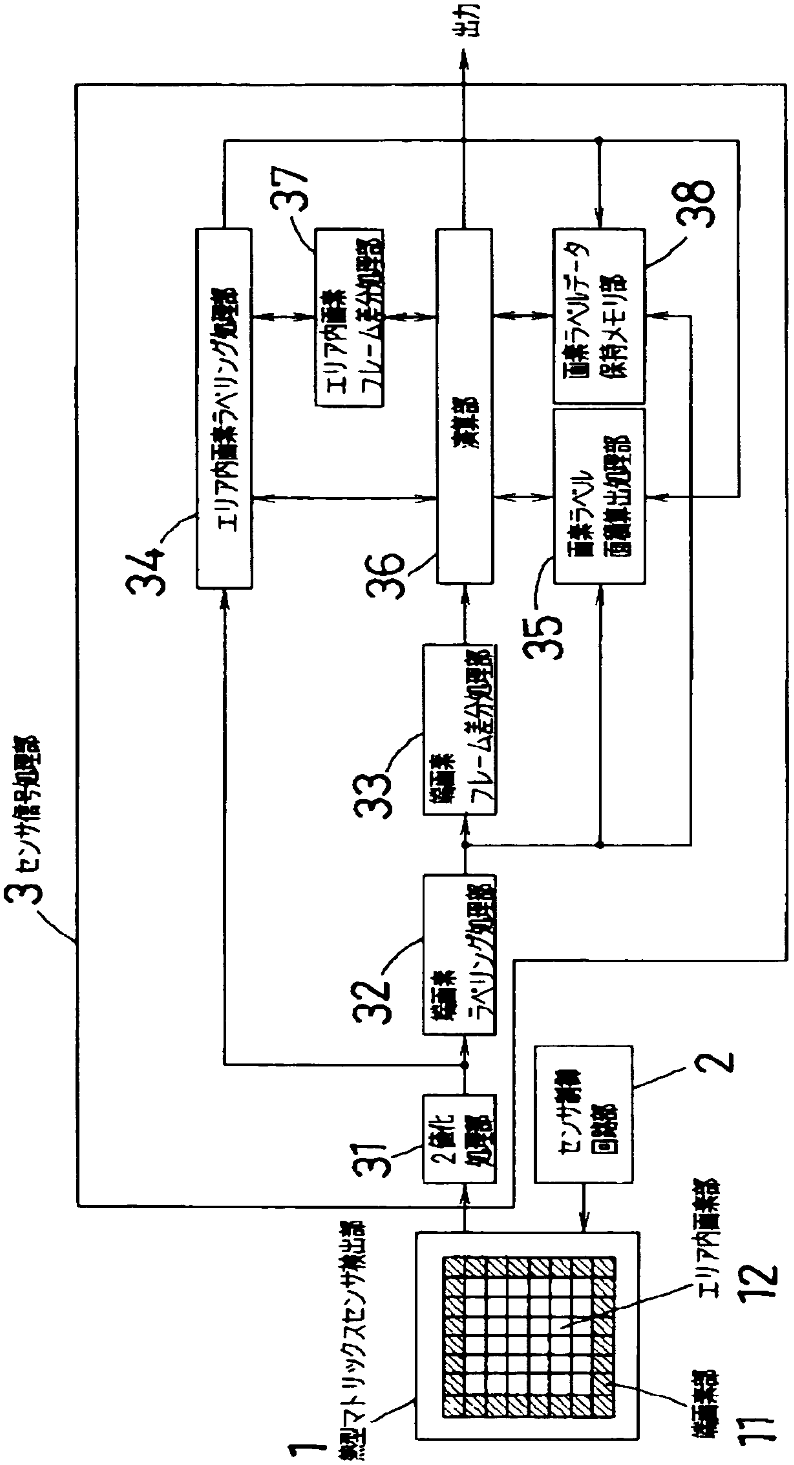
[Drawing 9]



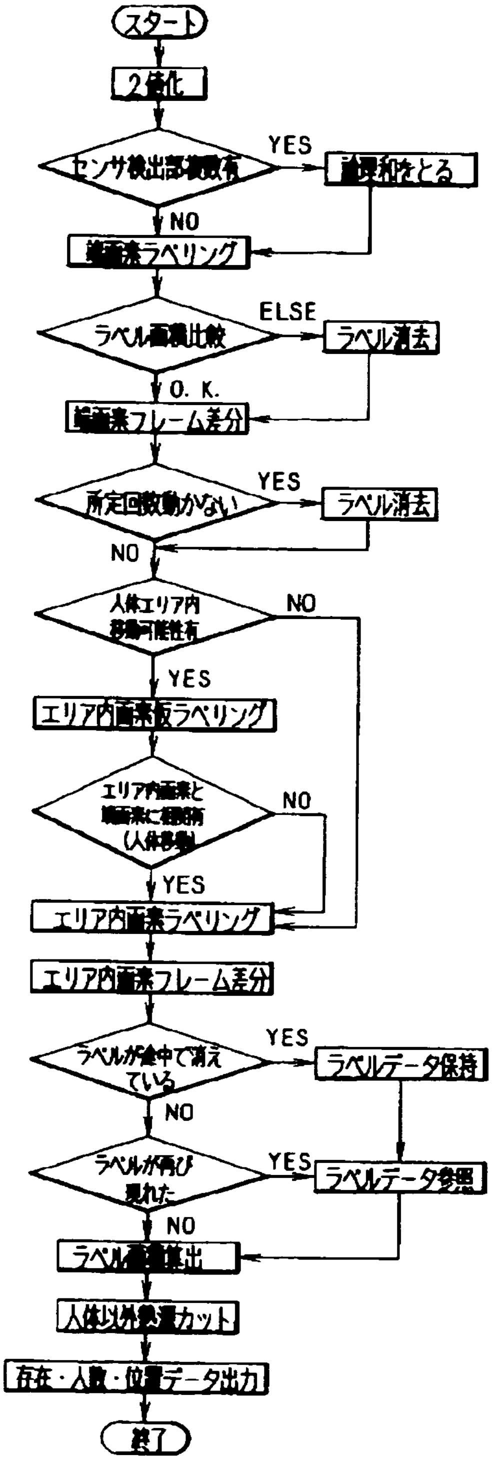
[Drawing 10]



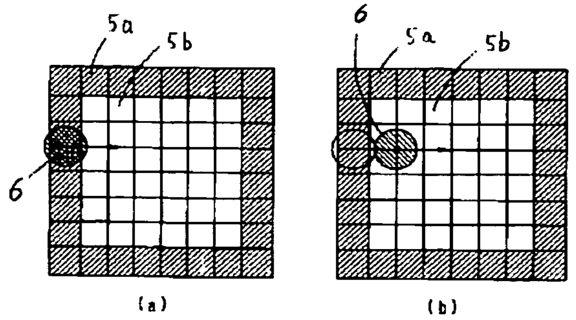
[Drawing 1]


1 熱型マトリックスセンサ検出部
11 端画素部
12 エリア内画素部
2 センサ制御回路部
3 センサ信号処理部
31 2値化処理部
32 端画素ラベリング処理部
33 端画素フレーム差分処理部
34 エリア内画素ラベリング処理部
35 画素ラベル面積算出処理部
36 演算部
37 エリア内画素フレーム差分処理部
38 画素ラベルデータ保持メモリ部
出力

[Drawing 2]

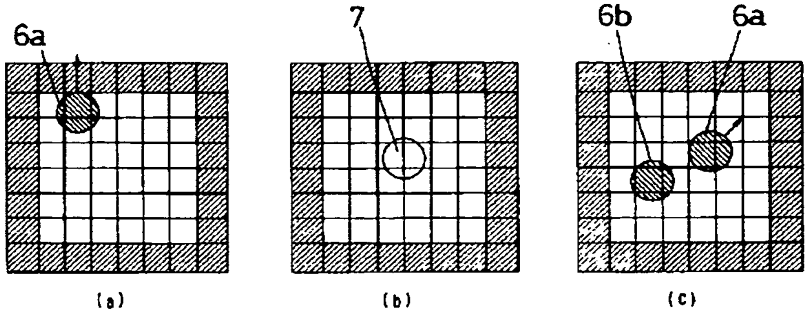

スタート
2値化
センサ検出部複数有
YES
論理和をとる
NO
熱画素ラベリング
ラベル面積比較
ELSE
ラベル消去
O. K.
熱画素フレーム差分
所定回数動かない
YES
ラベル消去
NO
人体エリア内
移動可能性有
NO
YES
エリア内画素仮ラベリング
エリア内画素と
熱画素に接触有
（人体移動）
NO
YES
エリア内画素ラベリング
エリア内画素フレーム差分
ラベルが途中で消え
ている
YES
ラベルデータ保持
NO
ラベルが再び
現れた
YES
ラベルデータ参照
NO
ラベル重心算出
人体以外熱源カット
存在・人数・位置データ出力
終了

[Drawing 7]


5a
5b
6
6
5a
5b

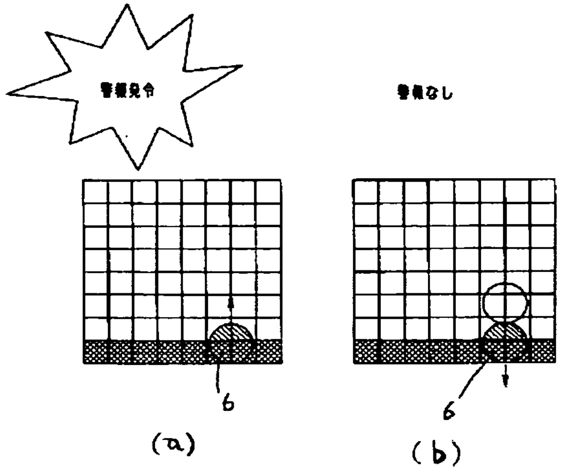
(a) (b)

[Drawing 8]



(a) (b) (c)

[Drawing 11]


警報発令
警報なし
6
6

(a) (b)

[Translation done.]